

# FCC BT LE REPORT

**FCC Certification** 

#### **Applicant Name:**

LG Electronics MobileComm U.S.A., Inc.

#### Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: November 08, 2016 Test Site/Location: HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majangmyeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-R-1611-F002 HCT FRN: 0005866421

# FCC ID : ZNFM200N APPLICANT : LG Electronics MobileComm U.S.A., Inc.

Model(s):	LG-M200n
EUT Type:	Portable Handset
<b>RF Peak Output Power:</b>	-3.155 dBm (0.484 mW)
Frequency Range:	2402 MHz -2480 MHz
Modulation type	GFSK
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

#### Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this

equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Seul Ki Lee Test Engineer of RF Team

Approved by : Yong Hyun Lee Manager of RF Team

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# <u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1611-F002	November 08, 2016	- First Approval Report



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# **1. GENERAL INFORMATION**

Applicant:	LG Electronics MobileComm U.S.A., Inc.
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFM200N
EUT Type:	Portable Handset
Model (s):	LG-M200n
Date(s) of Tests:	September 30, 2016 ~ November 2, 2016
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Model	LG-M200n				
EUT Type	Portable I	Portable Handset			
Power Supply	DC 3.85 \	DC 3.85 V			
Pottom / Information	Model: BL	45F1F			
Battery Infomation	Type: Li-l	on			
Frequency Range	TX: 2402 MHz ~ 2480 MHz RX: 2402 MHz ~ 2480 MHz				
	Peak	-3.155 dBm (0.484 mW)			
Max. RF Output Power	Average -3.410 dBm (0.456 mW)				
BT Operating Mode	BT _Low Energy Mode				
Modulation Type	GFSK				
Number of Channels	40 Channels				
	Manufacturer: Ace Technology				
Antenna Specification	Antenna type: Internal Antenna				
	Peak Gai	n : 1.65 dBi			

# 2. EUT DESCRIPTION



# **3. TEST METHODOLOGY**

FCC KDB 558074 D01 DTS Meas Guidance v03r05 dated April 8, 2016 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) and the measurement procedure described in ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices'.

# **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

# 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

# 3.3 GENERAL TEST PROCEDURES

# **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

# **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

# Conducted Antenna Terminal

See Section from 9.1 to 9.2.(KDB 558074 v03r05)

# 3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel low, mid and high with highest data rate (worst case) is chosen for full testing.



# 4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

# **5. FACILITIES AND ACCREDITATIONS**

# 5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

# 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

# 6. ANTENNA REQUIREMENTS

# According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

\* The antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203

# 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07



# 8. SUMMARY TEST OF RESULTS

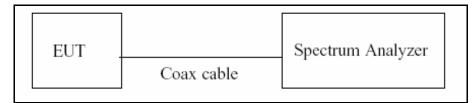
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz		PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band	CONDUCTED	PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.6.1		PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS

# 9. TEST RESULT 9.1 DUTY CYCLE

# TEST PROCEDURE

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW  $\geq$  OBW if possible; otherwise, set RBW to the largest available value. Set VBW  $\geq$  RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T  $\leq$  16.7 microseconds.)

# **TEST CONFIGURATION**



# TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested accroding to the zerospan measurement method, 6.0)b) in KDB 558074 v03r05.

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if  $T \le 6.25$  microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

- 1. RBW = 8 MHz (the largest available value)
- 2. VBW = 8 MHz (≥ RBW)
- 3. SPAN = 0 Hz
- 4. Detector = Peak
- 5. Number of points in sweep > 100
- 6. Trace mode = Clear write
- 7. Measure  $T_{total} \,and \, T_{on}$
- 8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor = 10\*log(1/Duty Cycle)

LE Mode	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
	0.3914	0.6245	0.6268	2.03



#### RESULT PLOTS

	AC	SENSE:INT	ALIGNAUTO #Avg Type: Pwr(RMS)	D6:26:29 AMNov 01, 2016 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 16 dB	Hory Type. Pwi((103)		
Ref Offset 10. dB/div Ref 15.00 d			Δ	Mkr3 624.5 µs -1.29 dB	Auto Tur
99 00 00 5.0		Xa	<sub>\(\)</sub> 1Δ2	3∆4	Center Fre 2.402000000 GH
5.0	Later a start at the second start of the secon			tumer hander	<b>Start Fre</b> 2.402000000 GF
5.0					<b>Stop Fre</b> 2.402000000 GH
enter 2.402000000 G es BW 8 MHz R MODE TRC SCL Δ2 1 t (Δ)		8.0 MHz Y FL -7.18 dB	Sweep 1.2	Span 0 Hz 267 ms (1001 pts) FUNCTION VALUE	CF Ste 8.000000 Mi <u>Auto</u> Mi
2         F         1         t           3         Δ4         1         t         (Δ)           4         F         1         t         (Δ)           5         -         -         -         -           6         -         -         -         -         -           7         -         -         -         -         -         -	551.0 μs 624.5 μs (Δ) 551.0 μs	-4.03 dBm -1.29 dB -4.03 dBm			Freq Offs 0 F
3					

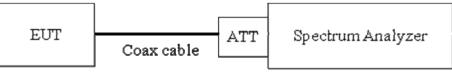
# 9.2 6 dB BANDWIDTH MEASUREMENT

# Test Requirements and limit, §15.247(a)(2)

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

# **TEST CONFIGURATION**



# TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.1 in KDB 558074 v03r05)

RBW = 100 kHz VBW  $\geq$  3 x RBW Detector = Peak Trace mode = max hold Sweep = auto couple Allow the trace to stabilize

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

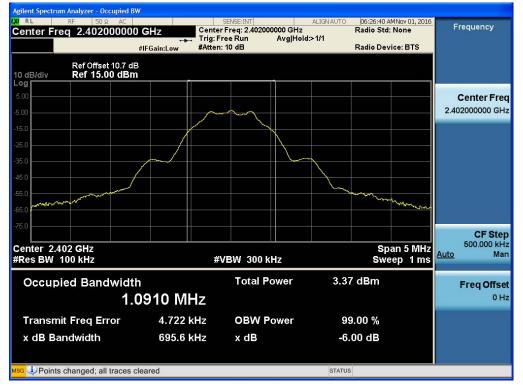
#### TEST RESULT

Mode	Channel	6 dB Bandwidth		Pass/Fail	
Mode	Channel	(kHz)	(kHz)	Fass/Fall	
	0	695.6		Pass	
BT LE	19	696.9	> 500	Pass	
	39	693.6		Pass	

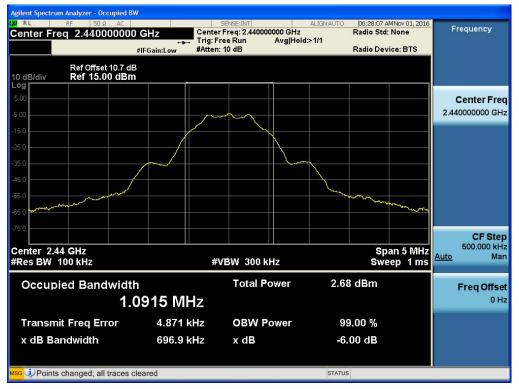


# RESULT PLOTS

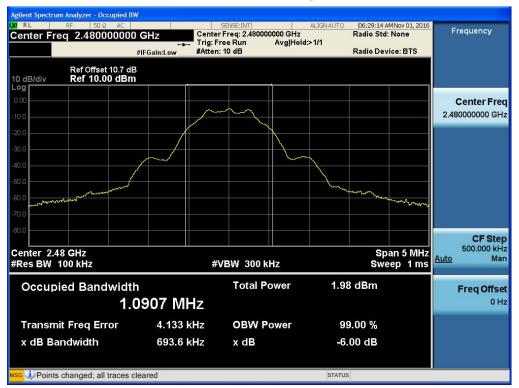
6 dB Bandwidth plot (Low-CH 0)



# 6 dB Bandwidth plot (Mid-CH 19)







#### 6 dB Bandwidth plot (High-CH 39)

# 9.3 OUTPUT POWER MEASUREMENT

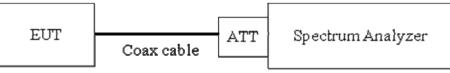
# Test Requirements and limit, §15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a Spectrum Analyzer.

Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

# **TEST CONFIGURATION**



# TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function.

This EUT TX condition is actual operating mode by BT LE mode test program.

The Spectrum Analyzer is set to

```
    Peak Power (Procedure 9.1.1 in KDB 558074 v03r05)
```

RBW ≥ DTS Bandwidth

- $VBW \ge 3 \times RBW$
- SPAN  $\ge$  3 x RBW

Detector Mode = Peak

Sweep = auto couple

Trace Mode = max hold

Allow trace to fully stabilize.

Use peak marker function to determine the peak amplitude level

Average Power (Procedure 9.2.2.4 in KDB 558074 v03r05)

Measure the duty cycle

Set span to at least 1.5 times the OBW

RBW = 1-5 % of the OBW, not to exceed 1 MHz.

VBW  $\geq$  3 x RBW.

Number of points in sweep  $\ge 2 x \text{ span} / \text{RBW}$ . (This gives bin-to-bin spacing  $\le \text{RBW}/2$ ,

so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS(i.e., power averaging)

Do not use sweep triggering. Allow the sweep to "free run".

Trace average at least 100 traces in power averaging(RMS) mode.



Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

# Sample Calculation

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor Output Power = 10 dBm + 10 dB + 0.8 dB + 0.2 dB = 21.0 dBm

Note :

- 1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
- 2. Spectrum offset = Attenuator loss + Cable loss
- 3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.7 dB is offset for 2.4 GHz Band.



# TEST RESULTS-Peak

#### Conducted Output Power Measurements

LE Mode		Measured	Limit	
Frequency[MHz]	Channel No.	Power(dBm)	(dBm)	
2402	0	-3.155	30	
2440	19	-3.851	30	
2480	39	-4.556	30	

# TEST RESULTS-Average

#### **Conducted Output Power Measurements**

LE Me	ode		Duty Cycle		
Frequency[MHz]	Channel No.	Measured Power(dBm)	Duty Cycle Factor (dB)	Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
2402	0	-5.44	2.03	-3.41	30
2440	19	-6.10	2.03	-4.07	30
2480	39	-6.85	2.03	-4.82	30



# RESULT PLOTS-Peak



# Conducted Output Power (Low-CH 0)

# Conducted Output Power (Mid-CH 19)







Agilent Spectrum Analyzer - Swept SA	SENSE		06:29:23 AMNov 01, 2016	Francisco
	PNO: Fast + Trig: Free R		TRACE 123456 TYPE MWWWW DET PPPPP	Frequency
Ref Offset 10.7 dB 10 dB/div Ref 10.00 dBm	IFGain:Low Atten: 10 dE		2.480 224 GHz -4.556 dBm	Auto Tune
0.00		1		Center Freq 2.480000000 GHz
-10.0				Start Fred 2.478500000 GHz
-30.0				Stop Fred 2.481500000 GHz
-50.0				CF Step 300.000 kH Auto Mar
70.0				Freq Offse 0 H
-®0.0 Center 2.480000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Sween	Span 3.000 MHz 1.07 ms (1000 pts)	
AND AND THE MARKED AND AND AND AND AND AND AND AND AND AN		STATUS		-

# Conducted Output Power (High-CH 39)



# RESULT PLOTS-Average



# Conducted Output Power (Low-CH 0)

# Conducted Output Power (Mid-CH 19)







### **Conducted Output Power (High-CH 39)**

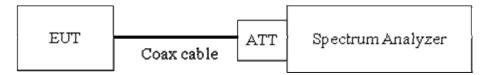
# 9.4 POWER SPECTRAL DENSITY

# Test Requirements and limit, §15.247(e)

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

We tested according to Procedure 10.2 in KDB 558074 v03r05

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

 $RBW = 3 kHz \le RBW \le 100 kHz.$ 

VBW  $\geq$  3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

# Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) Output Power = -5 dBm + 10 dB + 0.8 dB = 5.8 dBm Note :

- 1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
- 2. Spectrum offset = Attenuator loss + Cable loss
- 3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So,10.7 dB is offset for 2.4 GHz Band.



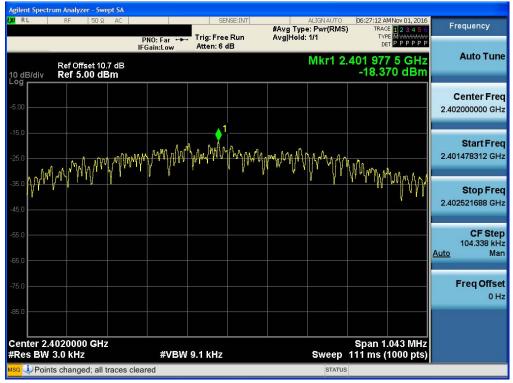
# TEST RESULTS

Frequency	Channel		Test Result						
(MHz)	No.	Mode	PSD	Limit	Pass/				
(11112)	NO.		(dBm)	(dBm)	Fail				
2402	0		-18.370	8	Pass				
2440	19	LE	-18.997	8	Pass				
2480	39		-19.705	8	Pass				

#### **Conducted Power Density Measurements**

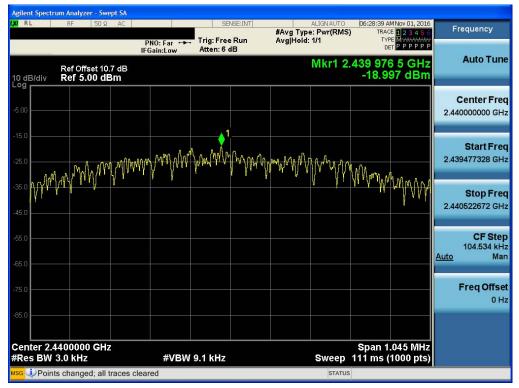


# RESULT PLOTS



# Power Spectral Density (Low-CH 0)

# Power Spectral Density (Mid-CH 19)









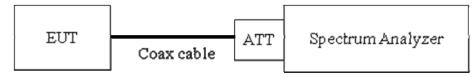
# **Power Spectral Density (High-CH 39)**



# 9.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.205(c)).

# Limit : 20 dBc TEST CONFIGURATION



# TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074 v03r05)

RBW = 100 kHz

 $VBW \ge 3 \times RBW$ 

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ 2\*Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10<sup>th</sup> harmonic range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1(KDB558074 v03r05), so the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).



- 2. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
- 3. Spectrum offset = Attenuator loss + Cable loss
- 4. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.7 dB is offset for 2.4 GHz Band.
- 5. In case of conducted spurious emissions test, please check factors blow table.
- 6. In order to simplify the report, attached plots were only the worst case channel and data rate.

Freq(MHz)	Factor(dB)
30	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400*	10.65
2500*	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68
13000	11.83
14000	11.90
15000	11.98

# **FACTORS FOR FREQUENCY**



#### Report No.: HCT-R-1611-F002

Model: LG-M200n

12.04
12.02
12.08
12.07
12.14
12.17
12.31
12.60
12.34
12.53

Note : 1. '\*' is fundamental frequency range.

2. Factor = Cable loss + Attenuator loss

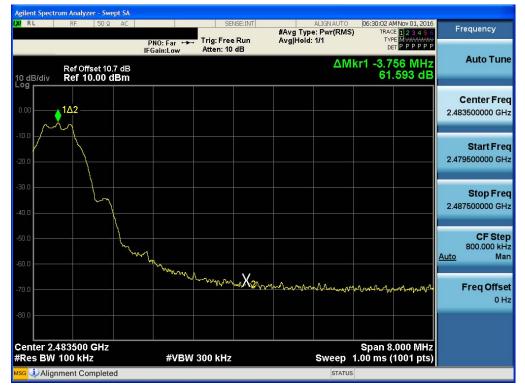


# RESULT PLOTS

#### BandEdge (Low-CH 0)



# BandEdge (High-CH 39)



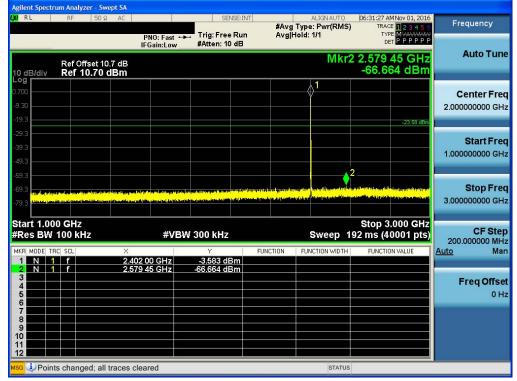


# 30 MHz ~ 1 GHz

							•			
gilent Spectro	um Analyzer	- Swept SA								
RL	RF	50 Ω AC		SE	NSE:INT		ALIGN AUTO		Nov 01, 2016	Frequency
							e: Pwr(RMS)	TRACE	123456	
			PNO: Fast +	Trig: Fre		Avg Hold	: 1/1	TYPE	M WWWWWW P P P P P P P	1
			IFGain:Low	#Atten: 1	) dB			DEI		
							Mk	r1 897.6	S6 MHZ	Auto Tu
	Ref Offse	et 10.7 dB					TVI IX		0 dBm	
0 dB/div	Ref 10.	70 dBm						-00.07	U UBIII	
<sup>og</sup>										
										Center Fr
700		20	e.							515.000000 M
										515.000000 M
.30										
										Start Fr
										30.000000 M
9.3										30.000000 M
									-23.58 dBm	
9.3										
9.0										Stop Fr
										1.000000000 G
9.3										1.00000000 G
9.3										CF St
										97.000000 M
										Auto N
9.3									. 2	
									1 4	
9.3								Y		Freq Offs
and a should be	as have been been all as	Store a strategy and the	Hilling , Angelen and the base	al an all all all a	Dubl. Bublicon	and the fly and the first state of the second	and a start of a start of the	a hand a hand a hand a h	inder alternation from	. 0
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9.3										а
tart 30.0	MHz							Stop 1.0		
Res BW			#\/B\M	300 kHz			Sweep 93			
CCS DW	TOO KHZ		#VDVV	300 KHZ			aweeh aa	.5 ms (20	iooo pis)	

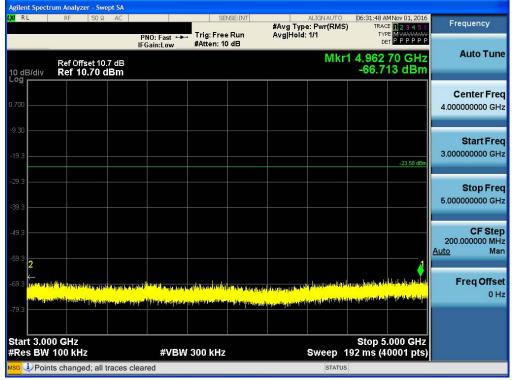
# **Conducted Spurious Emission (Low-CH 0)**

#### 1 GHz ~ 3 GHz



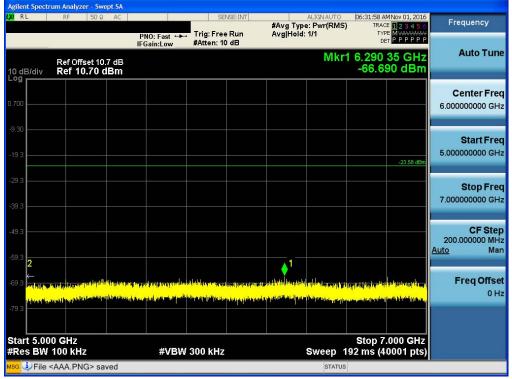


#### 3 GHz ~ 5 GHz



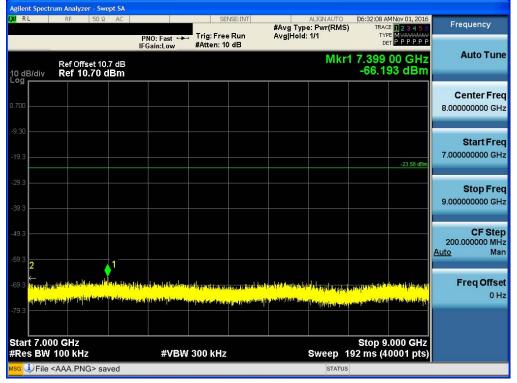
# Conducted Spurious Emission (Low-CH 0)

#### 5 GHz ~ 7 GHz



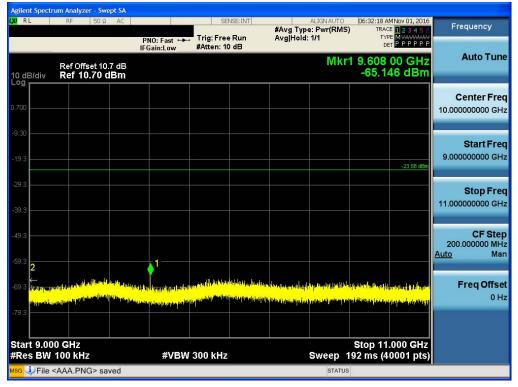


# 7 GHz ~ 9 GHz



# **Conducted Spurious Emission (Low-CH 0)**

#### 9 GHz ~ 11 GHz





# 11 GHz ~ 13 GHz

	Analyzer - Swept SA		12						
	RF 50 Ω AC			NSE:INT		ALIGNAUTO Pwr(RMS)	TRAC	MNov 01, 2016 E 1 2 3 4 5 6 E M WWWWW	Frequency
	ef Offset 10.7 dB ef 10.70 dBm	PNO: Fast ↔ IFGain:Low	#Atten: 10		Avginoid.		DE 12.649	70 GHz 60 dBm	Auto Tune
0.700								C	Center Freq 12.000000000 GHz
-9.30								-23.58 dBm	Start Freq 11.000000000 GHz
-29.3									<b>Stop Freq</b> 13.000000000 GHz
-49.3							1		CF Step 200.000000 MHz <u>Auto</u> Man
	lan lining in particular	and the least of the dead of the			, ya ka an ingi ka sa an	understanskaladele Regisjonskaladele		ahlahantun da ada <sup>19</sup> - Santana ang ang	Freq Offset 0 Hz
-79.3 Start 11.000							Stop 13	.000 GHz	
#Res BW 100	0 kHz	#VBW	300 kHz			Sweep 1	92 ms (4	0001 pts)	

# Conducted Spurious Emission (Low-CH 0)

#### 13 GHz ~ 15 GHz

Agilent Spectrum Analyzer - Swep XI RL RF 50 Ω	AC	SENSE:INT	ALIGN AUTO	06:32:39 AMNov 01, 2016	
			#Avg Type: Pwr(RMS) Avg Hold: 1/1		Frequency
Ref Offset 10.7 10 dB/div Ref 10.70 dB		#Atten: 10 dB		DET PPPPPP 14.986 95 GHz -64.303 dBm	Auto Tune
2.700					Center Freq 14.000000000 GHz
.19.3				-23.58 dBm	Start Freq 13.00000000 GHz
-29.3					<b>Stop Freq</b> 15.00000000 GHz
49.3 59.3				1	CF Step 200.000000 MH Auto Mar
-69.3 To a Ulfrach da da da a da a da a da a da a da a	the second state of the second state of		yn a sleddiodd yn Alladiaeth a slynd yllyn Mae pynaeth ar <sup>dae</sup> nn fewr Arlan ywr ymae Mae yn ar far ar daenn fewr Arlan ywr Arma		Freq Offset 0 Hz
-79.3 Start 13.000 GHz #Res BW 100 kHz	#VBV	/ 300 kHz	Sweep 1	Stop 15.000 GHz 92 ms (40001 pts)	
<mark>usg</mark> 🕹 File <aaa.png> save</aaa.png>			STATUS		



# 15 GHz ~ 17 GHz

	um Analyzer - Swept							
Start Fre	rf 50 Ω q 15.000000	AC 000 GHz	SENSE:	#Avg Type	ALIGNAUTO e: Pwr(RMS)	06:35:09 AM TRACE	Nov 01, 2016 1 2 3 4 5 6 M WANAAAA	Frequency
10 dB/div	Ref Offset 10.7 Ref 10.70 dB	PNO: Fast ++- IFGain:Low dB	Trig: Free Ru #Atten: 10 dB			DET	PPPPP	Auto Tune
Log								Center Freq 16.00000000 GHz
-9.30							-23.58 dBm	<b>Start Freq</b> 15.000000000 GHz
-29.3								<b>Stop Freq</b> 17.000000000 GHz
-49.3				1				CF Step 200.000000 MHz <u>Auto</u> Man
-69.3 <mark>Jawame</mark>	instructure interview of the test of the second	kalara di Yu, Mandal din Ukal dan fina Pentapan dan pentapatan di Kalan dan terterakan Pentapan dan pentapatan dan terterakan dari kalan dari kalan dari	de l'adre de la compañía de la comp Nacional de la compañía	ى بىر يەرىپىيە بىر يەرىپىيە بەر يەرىپىيە بىر يەرىپىيە بىر يەرىپى مەرىپىيە بىر يەرىپىيە بىر يەرىپى	en belen in de		alindari di di allin Mana ang manganan	<b>Freq Offset</b> 0 Hz
-79.3 Start 15.0 #Res BW		#VBW	300 kHz		Sweep 19	Stop 17.0 2 ms (40		
MSG					STATUS			

# Conducted Spurious Emission (Low-CH 0)

#### 17 GHz ~ 19 GHz

	PNO: Fast +>+				TRAC TYP DE 18.985	How 01, 2016 [] 2 3 4 5 5 E M WAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Frequency Auto Tune Center Free 18.00000000 GH: Start Free 17.00000000 GH:
set 10.7 dB			Avg]Hold:		TYP DE 18.985	30 GHz 78 dBm	Center Fred 18.00000000 GH: Start Fred
						-23.58 dBm	18.000000000 GH: Start Free
						-23.58 dBm	
	3						<b>Stop Fred</b> 19.000000000 GH
							<b>CF Step</b> 200.000000 MH: <u>Auto</u> Mar
inide de la composition de la composition Composition de la composition de la comp							Freq Offse 0 H:
				Swoon 1	Stop 19.	000 GHz	
	4.000	<mark>են է հանձար չի դաս է էր և եր է եր է է է է է է է է է է է է է է է է</mark>		ne Romann y y genergy Light Sale, y fal da Olivak, de piel generg her y Gigt Addinet Level μα en genergen oor een die Ne Romann y genergy Light Sale ( her	ne Brennen gegenzegen gestenden fall dat de teken. Im mit gener gener fan steden in sen de neer generen ook de steden de steden ook de ste		



# 19 GHz ~ 21 GHz

RL	RF 5	50 Ω AC		SEI	NSE:INT		ALIGNAUTO		MNov 01, 2016	Frequency
			PNO: Fast	. Trig: Free #Atten: 10		#Avg Typ Avg Hold:	e: Pwr(RMS) 1/1	TYF	Е <mark>123456</mark> ЕМ <del>МИИИИ</del> ТРРРРРР	
0 dB/div	Ref Offset Ref 10.7						Mkr1		50 GHz 09 dBm	Auto Tu
700									5	Center Fr 20.000000000 G
9.30 19.3									-23.58 dBm	Start Fr 19.00000000 G
29.3 19.3									C	Stop Fr 21.000000000 G
19.3					t all the second			<b>↓</b> 1	. of spanipalities,	CF St 200.000000 M <u>Auto</u> N
9913 <mark>(real fortion</mark>			un de part de condition de la participa <mark>Ante participa de constant de la participa de la Ante participa de la participa d</mark>							Freq Off 0
<sup>79,3</sup>	000 GHz						Sweep 1		.000 GHz	

# **Conducted Spurious Emission (Low-CH 0)**

#### 21 GHz ~ 23 GHz





# 23 GHz ~ 25 GHz

Agilent Spectr	rum Analyzer - Swept SA RF 50 Ω AC		CEA	SE:INT		ALIGNAUTO	06:34:26 AMI	Nov 01 2016	
Start Fre	q 23.000000000	PNO: Fast ++-		Run	#Avg Typ Avg Hold:	e: Pwr(RMS)	TRACE TYPE	123456 MWWWWW PPPPPP	Frequency
10 dB/div	Ref Offset 10.7 dB Ref 10.70 dBm	IFGain:Low	#Atten: 10	ab		Mkr1	24.992 6 -54.78	0 GHz	Auto Tune
.700									Center Free 24.000000000 GH
9.30								-23.58 dBm	<b>Start Fre</b> 23.000000000 GH
29.3 39.3									<b>Stop Fre</b> 25.00000000 GH
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59.3 <b>12 11 11 11 11 11 11 11 11 11 11</b>	A file på det som stalle besterne at det som stalle besterne at det som stalle besterne at det som stalle beste Here fille som stalle besterne at det som stalle besterne at det som stalle besterne at det som stalle besterne	nn a schille die komme die angle en see		n na hayiye na kana ya d	nain para si ini kanit ini k	unayak kotan, day <sub>ka</sub>	an an an an Andrea An Andrea an Andrea		Freq Offse 0 H
<sup>.79.3</sup> Start 23.0 #Res BW		#\/P\\	300 kHz			Sween 1	Stop 25.0 92 ms (40		
Res DW	TOURHZ	#VBVV	300 KHZ			Sweep	92 IIIS (40	oo r pis)	



# 9.6 RADIATED MEASUREMENT. 9.6.1 RADIATED SPURIOUS EMISSIONS.

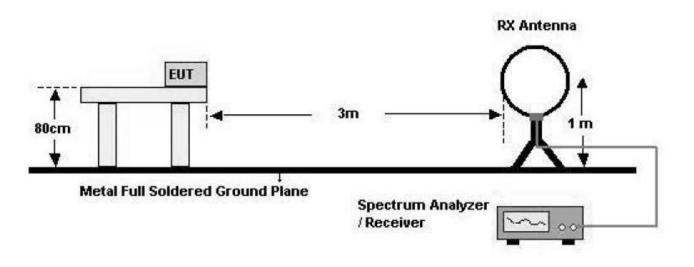
Test Requirements and limit, §15.205, §15.209

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)	
0.009 - 0.490	2400/F(kHz)	300	
0.490 – 1.705	0.490 – 1.705 24000/F(kHz)		
1.705 – 30	30	30	
30-88	100	3	
88-216	150	3	
216-960	200	3	
Above 960	500	3	

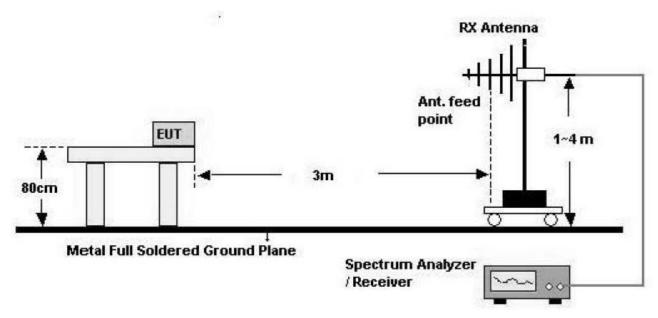


#### **Test Configuration**

#### Below 30 MHz

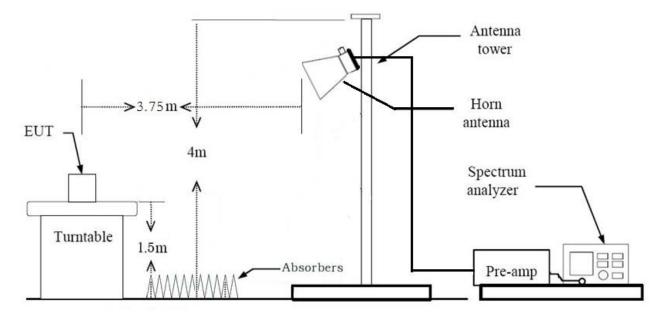


30 MHz - 1 GHz





# Above 1 GHz



# TEST PROCEDURE USED

Method 12.1 in KDB 558074 v03r05

#### Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW  $\geq$  3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

	nequency
Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

#### Table 1 — RBW as a function of frequency

- Average (duty cycle < 98%, duty cycle variations are less than  $\pm 2\%$ )



Set RBW = 1 MHz Set VBW  $\ge$  3 x RBW Detector = RMS. Averaging type = power (*i.e.*, RMS). Sweep time = auto.

Trace mode = average (at least 100 traces).

A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.

#### Note :

1. We are performed the RSE and radiated band edge using standard radiated method(RMS).

2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).

3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

LE Mode	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
	0.3914	0.6245	0.6268	2.03



# TEST RESULTS

## 9 kHz – 30MHz

#### **Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

- 1. Measuring frequencies from 9 kHz to the 30MHz.
- 2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
- 3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
- 4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
- 5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



# TEST RESULTS

# Below 1 GHz

#### **Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

- 1. Measuring frequencies from 30 MHz to the 1 GHz.
- 2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



# Above 1 GHz

**Operation Mode: CH.0** 

Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4804	49.66	0.00	-0.61	V	49.05	73.98	24.93	PK
4804	37.41	2.03	-0.61	V	38.83	53.98	15.15	AV
7206	45.44	0.00	8.78	V	54.22	73.98	19.76	PK
7206	34.12	2.03	8.78	V	44.93	53.98	9.05	AV
4804	49.27	0.00	-0.61	Н	48.66	73.98	25.32	PK
4804	37.28	2.03	-0.61	Н	38.7	53.98	15.28	AV
7206	45.12	0.00	8.78	Н	53.9	73.98	20.08	PK
7206	34.11	2.03	8.78	Н	44.92	53.98	9.06	AV

\*A.F. : Antenna Factor / C.L. : Cable Loss / A.G. : Amplifier Gain / D.F. : Distance Factor

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4880	50.06	0.00	0.19	V	50.25	73.98	23.73	PK
4880	37.83	2.03	0.19	V	40.05	53.98	13.93	AV
7320	46.14	0.00	8.85	V	54.99	73.98	18.99	PK
7320	34.23	2.03	8.85	V	45.11	53.98	8.87	AV
4880	49.80	0.00	0.19	Н	49.99	73.98	23.99	PK
4880	37.69	2.03	0.19	Н	39.91	53.98	14.07	AV
7320	45.73	0.00	8.85	Н	54.58	73.98	19.40	PK
7320	34.18	2.03	8.85	Н	45.06	53.98	8.92	AV

# Operation Mode: CH.19

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



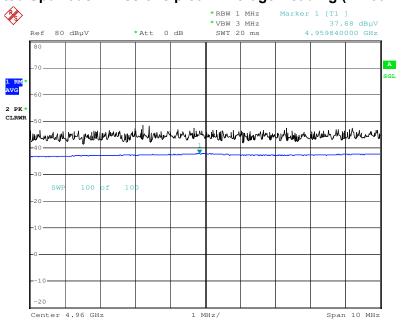
Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4960	50.29	0.00	0.92	V	51.21	73.98	22.77	PK
4960	37.88	2.03	0.92	V	40.83	53.98	13.15	AV
7440	45.96	0.00	9.03	V	54.99	73.98	18.99	PK
7440	34.02	2.03	9.03	V	45.08	53.98	8.90	AV
4960	50.12	0.00	0.92	Н	51.04	73.98	22.94	PK
4960	37.72	2.03	0.92	Н	40.67	53.98	13.31	AV
7440	45.54	0.00	9.03	Н	54.57	73.98	19.41	PK
7440	33.93	2.03	9.03	Н	44.99	53.98	8.99	AV

Operation Mode: CH.39

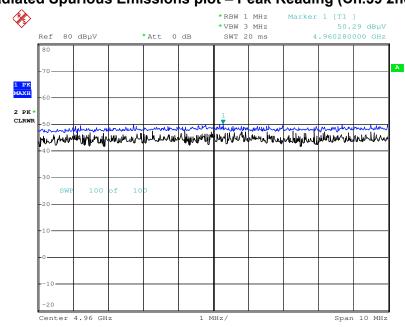
- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



# RESULT PLOTS (Worst case : Y-V) Radiated Spurious Emissions plot – Average Reading (Ch.39 2nd Harmonic)



Date: 24.0CT.2016 11:55:38



# Radiated Spurious Emissions plot – Peak Reading (Ch.39 2nd Harmonic)

#### Note : Only the worst case plots for Radiated Spurious Emissions.

Date: 24.0CT.2016 11:52:10



# 9.6.2 RADIATED RESTRICTED BAND EDGES

#### Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode	BT_LE
Operating Frequency	2402 MHz
Channel No.	0

Frequency	Reading	Duty Cycle Factor	A.F.+C.L.+D.F.	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	50.59	0.00	0.32	Н	50.91	73.98	23.07	PK
2390.0	39.87	2.03	0.32	Н	42.22	53.98	11.76	AV
2390.0	50.20	0.00	0.32	V	50.52	73.98	23.46	PK
2390.0	39.63	2.03	0.32	V	41.98	53.98	12.00	AV

- 1. Frequency range of measurement = 2310 MHz ~ 2390 MHz
- 2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor
- 3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Operation Mode	BT_LE
Operating Frequency	2480 MHz
Channel No.	39

Frequency	Reading	Duty Cycle Factor	A.F.+C.L.+D.F.	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2483.5	54.64	0.00	0.92	н	55.56	73.98	18.42	PK
2483.5	46.68	2.03	0.92	Н	49.63	53.98	4.35	AV
2483.5	54.00	0.00	0.92	V	54.92	73.98	19.06	PK
2483.5	46.35	2.03	0.92	V	49.30	53.98	4.68	AV

## Notes:

1. Frequency range of measurement = 2483.5 MHz ~ 2500 MHz

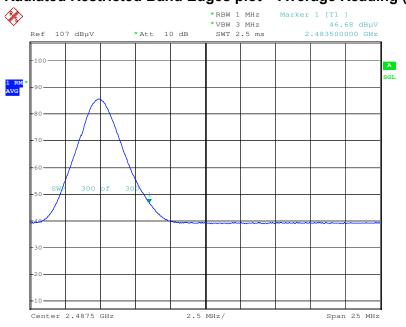
2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor

3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

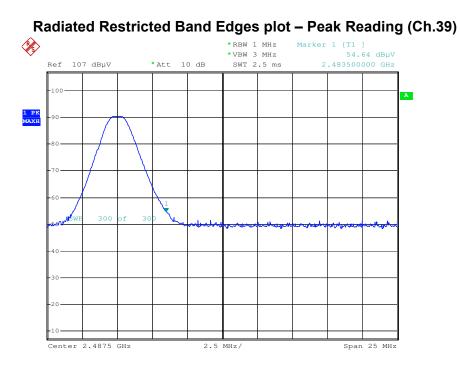
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



## RESULT PLOTS (Worst case : X-H) Radiated Restricted Band Edges plot – Average Reading (Ch.39)



Date: 24.0CT.2016 12:23:39



Date: 24.0CT.2016 12:24:37

#### Note : Only the worst case plots for Radiated Restricted Band Edges.



# 9.7 POWERLINE CONDUCTED EMISSIONS

# Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

	Limits	(dBµV)
Frequency Range (MHz)	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

# **Test Configuration**

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

# **TEST PROCEDURE**

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to a test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors Quasi Peak and Average Detector.

# Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor



# RESULT PLOTSConducted Emissions (Line 1)

BT LE MODE L1

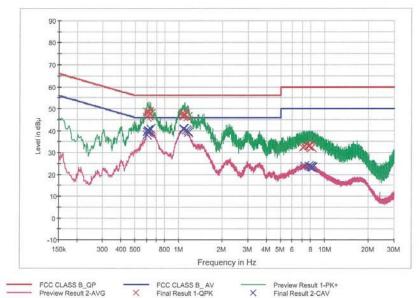
1/2

# **HCT TEST Report**

## Common Information

EUT: Manufacturer: Test Site: Operating Conditions: LG-M200n LG SHIELD ROOM BT LE MODE





#### **Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.600000	48.5	9.000	Off	L1	9.7	7.5	56.0
0.604000	46.3	9.000	Off	L1	9.7	9.7	56.0
0.612000	48.4	9.000	Off	L1	9.7	7.6	56.0
0.620000	46.9	9.000	Off	L1	9.7	9.1	56.0
0.626000	48.7	9.000	Off	L1	9.7	7.3	56.0
0.636000	47.5	9.000	Off	L1	9.7	8.5	56.0
1.060000	48.1	9.000	Off	L1	9.8	7.9	56.0
1.068000	46.6	9.000	Off	L1	9.8	9.4	56.0
1.072000	47.4	9.000	Off	L1	9.8	8.6	56.0
1.090000	47.2	9.000	Off	L1	9.8	8.8	56.0
1.100000	47.0	9.000	Off	L1	9.8	9.0	56.0
1.148000	46.4	9.000	Off	L1	9.8	9.6	56.0
7.116000	32.5	9.000	Off	L1	10.0	27.5	60.0
7.310000	32.7	9.000	Off	L1	10.0	27.3	60.0
7.764000	32.9	9.000	Off	L1	10.0	27.1	60.0
7.830000	32.9	9.000	Off	L1	10.0	27.1	60.0
7.924000	32.9	9.000	Off	L1	10.0	27.1	60.0
8.218000	32.5	9.000	Off	L1	10.0	27.5	60.0

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#### BT LE MODE L1

#### **Final Result 2**

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.600000	39.5	9.000	Off	L1	9.7	6.5	46.0
0.604000	38.1	9.000	Off	L1	9.7	7.9	46.0
0.612000	40.1	9.000	Off	L1	9.7	5.9	46.0
0.616000	39.4	9.000	Off	L1	9.7	6.6	46.0
0.620000	40.1	9.000	Off	L1	9.7	5.9	46.0
0.636000	40.8	9.000	Off	L1	9.7	5.2	46.0
1.072000	40.9	9.000	Off	L1	9.8	5.1	46.0
1.088000	40.7	9.000	Off	L1	9.8	5.3	46.0
1.120000	40.2	9.000	Off	L1	9.8	5.8	46.0
1.144000	39.8	9.000	Off	L1	9.8	6.2	46.0
1.148000	39.7	9.000	Off	L1	9.8	6.3	46.0
1.166000	39.3	9.000	Off	L1	9.8	6.7	46.0
7.310000	23.8	9.000	Off	L1	10.0	26.2	50.0
7.800000	23.9	9.000	Off	L1	10.0	26.1	50.0
7.972000	23.7	9.000	Off	L1	10.0	26.3	50.0
8.048000	23.5	9.000	Off	L1	10.0	26.5	50.0
8.218000	23.2	9.000	Off	L1	10.0	26.8	50.0
8.288000	23.1	9.000	Off	L1	10.0	26.9	50.0

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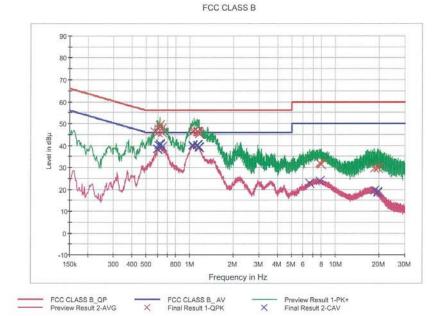
# **Conducted Emissions (Line 2)**

BT LE MODE N

**HCT TEST Report** 



BT LE MODE



#### **Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.576000	46.3	9.000	Off	N	9.7	9.7	56.0
0.600000	45.8	9.000	Off	N	9.7	10.2	56.0
0.612000	47.6	9.000	Off	N	9.7	8.4	56.0
0.624000	49.4	9.000	Off	N	9.7	6.6	56.0
0.636000	47.5	9.000	Off	N	9.7	8.5	56.0
0.650000	45.8	9.000	Off	N	9.7	10.2	56.0
1.042000	46.4	9.000	Off	N	9.7	9.6	56.0
1.070000	46.7	9.000	Off	N	9.7	9.3	56.0
1.116000	46.2	9.000	Off	N	9.7	9.8	56.0
1.140000	46.3	9.000	Off	N	9.7	9.7	56.0
1.146000	46.1	9.000	Off	N	9.7	9.9	56.0
1.164000	45.4	9.000	Off	N	9.7	10.6	56.0
7.780000	31.9	9.000	Off	N	10.0	28.1	60.0
7.952000	31.8	9.000	Off	N	10.0	28.2	60.0
7.980000	31.4	9.000	Off	N	10.0	28.6	60.0
18.642000	29.7	9.000	Off	N	10.3	30.3	60.0
19.484000	29.9	9.000	Off	N	10.3	30.1	60.0
19.714000	29.8	9.000	Off	N	10.3	30.2	60.0

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#### BT LE MODE N

#### **Final Result 2**

(MHz)	(dBµV)	Bandwidth (kHz)	Filter	Line	(dB)	(dB)	(dBµV)
0.598000	38.4	9.000	Off	N	9.7	7.6	46.0
0.602000	38.4	9.000	Off	N	9.7	7.6	46.0
0.614000	40.2	9.000	Off	N	9.7	5.8	46.0
0.622000	40.2	9.000	Off	N	9.7	5.8	46.0
0.626000	41.0	9.000	Off	N	9.7	5.0	46.0
0.650000	39.4	9.000	Off	N	9.7	6.6	46.0
1.042000	39.7	9.000	Off	N	9.7	6.3	46.0
1.046000	40.0	9.000	Off	N	9.7	6.0	46.0
1.116000	40.2	9.000	Off	N	9.7	5.8	46.0
1.140000	40.1	9.000	Off	N	9.7	5.9	46.0
1.146000	39.2	9.000	Off	N	9.7	6.8	46.0
1.164000	39.1	9.000	Off	N	9.7	6.9	46.0
6.666000	22.9	9.000	Off	N	9.9	27.1	50.0
7.780000	23.9	9.000	Off	N	10.0	26.1	50.0
7.840000	23.8	9.000	Off	N	10.0	26.2	50.0
18.642000	19.5	9.000	Off	N	10.3	30.5	50.0
19.416000	18.6	9.000	Off	N	10.3	31.4	50.0
19.484000	18.8	9.000	Off	N	10.3	31.2	50.0

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# 10. LIST OF TEST EQUIPMENT 10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/28/2015	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/28/2015	Annual	100584
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/24/2015	Annual	MY49431210
Agilent	N1911A / Power Meter	03/11/2016	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/11/2016	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/30/2015	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/14/2016	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/15/2016	Annual	07560
Rohde & Schwarz	CBT / Bluetooth Tester	05/16/2016	Annual	100422



# 10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/24/2016	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/13/2016	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	07/06/2016	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/26/2016	Annual	2
Agilent	8493C-10 / Attenuator(10 dB)	08/11/2016	Annual	76649
CERNEX	CBLU1183540 / Power Amplifier	07/15/2016	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/15/2016	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	07/11/2016	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	04/01/2016	Annual	3000C000276